process that is intended to optimise the radio system for a single terminal through the use of feedback control to the transmitter and its antennas.

Kraiem *et al.*

The patent by Kraiem does not operate the antennas at the same time; it is a two stage antenna selection process in which calibration signals are sent in the first stage to permit selection of the optimum antenna, followed by a second stage in which the selected antenna is used for communicating with the terminal and the process is intended to optimise the radio system for a single terminal using calibration signals to select the appropriate antenna.

Claim 1

There are three requirements for establishing a *prima facie* case of obviousness: 1) all features must be present; 2) there must be an expectation of a reasonable change of success; and 3) there must be some suggestion or motivation in the prior art to combine the references.

Claim 1 is directed to an Orthogonal Frequency Dvision Multiplexed (OFDM) Base Transceiver Station (BTS) arranged to communicate with a plurality of mobile terminals within a coverage area including at least one target mobile terminal, and recites in part:

"a transmission apparatus that operates to receive the processed service and data traffic information, to transmit the processed service information on a first set of carriers to the mobile terminals within the coverage area with at least one first transmission beam and to transmit the processed data traffic information on a second set of carriers to the target mobile terminal on at least one second transmission beam, the second transmission beam being a directional transmission beam".

Advantageously, two (or more) antennas are used at the same time with a subset of the OFDM information directed through one antenna to multiple users while at the same time the information intended for an individual user (or group) is sent through the other directional antenna.

This simultaneity is discussed in the specification, for example beginning at page 4 line 29, in Figure 4 which shows the formation of the simultaneous composite signal and in Figure 6 which shows the transmitter with the IFFT (66) feeding the two sets of antennas (104 and 96).

This enables communication with multiple terminals to be maintained while simultaneously using a directional antenna to send information to an individual terminal. Being able to maintain communication (e.g. pilot signals, synchronisation, control information) with users enables them to be more quickly respond when there are packets to send/receive with these terminals. Systems that optimise the radio link for a single terminal (such as those of Greenstein and Kraiem) must re-establish synchronisation and control signalling before sending/receiving traffic from these other terminals and hence incur additional overhead.

Neither of the cited references differentiate between the beams used for signalling and traffic information (service and data) as claimed. Greenstein sends both on each antenna; Kraiem only one antenna at a time in each receiver being used to send everything. Since this features is missing from both references, requirement 1) for a *prima facie* case of obviousness is not satisfied.

Regarding requirement 2), consider what might be the result of making one of the antennas of Greenstein directional, assuming for now that such a step might be considered as taught by Kraiem. Both data of multiple users and signalling is sent on all antennas of Greenstein. Therefore, if one antenna is suddenly directional, the signalling information would only be received by a subset of receivers, and the data could only be received by users in the coverage area of the directional beam, i.e., some receivers would not receive necessary signalling information and others would not receive data. The system singly would not work. This leads to lack of expectation of success and as such requirement 2) for a *prima facie* case of obviousness is also not satisfied.

It is respectfully submitted that none of the requirements for a *prima facie* case of obviousness are satisfied. The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claim 1.

Claims 32 and 46

Claims 32 and 46 are directed to an OFDM BTS and a radio system, respectively, and should be allowed for the same reasons as discussed above with reference to claim 1. The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claims 32 and 46.

Claims 2 to 5, 25 to 29, 33 to 34, and 41 to 42

Each one of claims 2 to 5, 25 to 29, 33 to 34, and 41 to 42 depends directly or indirectly on one of base claims 1 and 32 and should be allowed for the same reasons as discussed above with reference to claims 1 and 32. The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claims 2 to 5, 25 to 29, 33 to 34, and 41 to 42.

Claim 6

Claim 6 depends indirectly on claim 1 and should be allowed for the same reasons as discussed above with reference to claim 1. Furthermore, claim 6 recites the additional claim feature:

"wherein the transmission apparatus comprises a plurality of first transmission beam output paths, each of the first transmission beam output paths comprising a transmitter coupled to the processing apparatus and a directional antenna coupled to its respective transmitter; and

wherein each of the first transmission beam output paths receives the processed service information from the processing apparatus and operates to generate a portion of the first transmission beam, each of the portions of the first transmission beam being focussed on a portion of the coverage area".

The Examiner has referred to the Kraiem *et al.* reference as disclosure for the features of claim 6 relating to a "directional antenna", and again there is no reason to believe that there is any possible combination of the teachings of the Greenstein and Kraiem *et al.* references that produces the above claim features of claim 6 for the same reasons as discussed above with references to claim 1. Furthermore, there is no suggestion or motivation to combine the

references to produce the above claim features of claim 6 for the same reasons as discussed above with reference to claim 1. In particular, as discussed above there is no combination of the cited references that produces the directional beam of base claim 1 nor any suggestion or motivation to combine the cited references to produce such a beam, and for the same reasons there is no combination of the cited references that teaches a "directional antenna" in the system of the Greenstein *et al.* reference nor any suggestion or motivation to do so.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claim 6.

Claim 9

Claim 9 depends indirectly on claim 1 and should be allowed for the same reasons as discussed above with reference to claim 1. Furthermore, claim 9 recites "a directional antenna" and should be allowed for the same reasons as discussed above with reference to claim 6.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claim 9.

Claim 10

Claim 10 depends on claim 9 and should be allowed for the same reasons as discussed above with reference to claim 9. The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claim 9.

Claim 11

Claim 11 depends indirectly on claim 1 and should be allowed for the same reasons as discussed above with reference to claim 1. Furthermore, claim 11 recites "a set of the second transmission beam directional antennas to generate the directional second transmission beam" and should be allowed for the same reasons as discussed above with reference to claim 6.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claim 11.

Claim 12

Claim 12 depends on claim 11 and should be allowed for the same reasons as discussed above with reference to claim 11.

Claim 13

Claim 13 depends on claim 1 and should be allowed for the same reasons as discussed above with reference to claim 1. Furthermore, claim 13 recites:

"wherein the first transmission beam is a directional transmission beam; and

wherein the BTS is operable to modify the direction of focus of the directional first transmission beam in order for each of the mobile terminals within the coverage area to receive the processed service information".

The Examiner has referred to the Kraiem *et al.* reference as disclosure for this claim feature. With respect, as discussed above the Kraiem *et al.* reference discloses a system in which a mobile terminal modifies the direction of an antenna for communication with one other terminal, and there is no teaching in this reference nor in the Greenstein *et al.* reference of a BTS that is "operable to modify the direction of focus of the directional first transmission beam in order for each of the mobile terminals within the coverage area to receive the processed service information" (emphasis added).

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claim 13.

Claim 14

Claim 14 depends on claim 13 and should be allowed for the same reasons as discussed above with reference to claim 13. Furthermore, claim 14 recites the additional claim feature:

"wherein the BTS modifies the direction of focus of the directional first transmission beam such that each of the mobile terminals within the coverage area is focused by the directional first transmission beam for a corresponding time period in a repetitive fashion".

Again, the Examiner has referred to the Kraiem *et al.* reference as disclosure for this claim feature. However, as discussed above with reference to claim 13, the Kraiem *et al.* reference discloses modifying the direction of an antenna for communication with one other terminal, and there is no disclosure of a BTS modifying "redirection of focus of the directional first transmission beam such that each of the mobile terminals within a coverage area is focused by the directional first transmission beam for a corresponding time period in a repetitive fashion" (emphasis added).

Claims 19 to 23

Each one of claims 19 to 23 depends directly or indirectly on claim 13 and should be allowed for the same reasons as discussed above with reference to claim 13.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claims 19 to 23.

Claims 24 and 40

The Examiner has also rejected claims 24 and 40 under 35 U.S.C. 103(a) as being unpatentable over the Greenstein *et al.* and Kraiem *et al.* references and further in view of United States Patent No. 6,512,797 (Tellado *et al.*).

Each one of claims 24 and 40 depends on one of base claims 1 and 32 and should be allowed for the same reasons as discussed above with reference to base claims 1 and 32. In particular, the Examiner's rejection is based on the false premise that the Greenstein *et al.* and Kraiem *et al.* references disclose all of the features of base claims 1 and 32, and Applicant submits that the Tellado *et al.* reference also fails to disclose the features of base claims 1 and 32 that the Greenstein *et al.* and Kraiem *et al.* references fail to disclose.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claims 24 and 40.

Claims 30 and 31

The Examiner has rejected claims 30 and 31 under 35 U.S.C. 103(a) as being

unpatentable over the Greenstein *et al.* and Kraiem *et al.* references and further in view of United States Patent No. 6,678,527 (Rasanen).

Claims 30 and 31 contain all of the claim features of base claim 1 and should be allowed for the same reasons as discussed above with reference to claim 1. In particular, the Examiner's rejection of claims 30 and 31 is based on the false premise that the Greenstein *et al.* and Kraiem *et al.* references teach all of the claim references of claim 1, and Applicant submits that the Rasanen reference also fails to dislcose the claim features of claim 1 that the Greenstein *et al.* and Kraiem *et al.* references fail to disclose.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claims 30 and 31.

The Examiner has rejected claims 7 to 8, 15 to 18, and 35 under 35 U.S.C. 103(a) as being unpatentable over the Greenstein *et al.* and Kraiem *et al.* references, and further in view of United States Patent Application Publication No. 20040067775 (Dalal *et al.*).

Claims 7 to 8 and 35

Each one of claims 7 to 8 and 35 depends directly or indirectly on one of claims 1 and 32 and should be allowed for the same reasons as discussed above with reference to claims 1 and 32. In particular, the Examiner's rejection of claims 7 to 8 and 35 is based on the false premise that the Greenstein *et al.* and Kraiem *et al.* references disclose all of the features of base claims 1 and 32, and Applicant submits that the Dalal *et al* reference also fails to disclose the features of base claims 1 and 32 that the Greenstein *et al.* and Kraiem *et al.* references fail to disclose.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claims 7 to 8 and 35.

Claims 15 to 18

Claims 15 to 18 contain all of the claim features of claim 13 and should be allowed for the same reasons as discussed above with reference to claim 13. In particular, the Examiner's rejection of claims 15 and 18 is based on the false premise that the Greenstein *et al.* and

Kraiem *et al.* references disclose all of the features of claim 13, and Applicant submits that the Dalal *et al.* reference also fails to disclose the features of claim 13 that the Greenstein *et al.* and Kraiem *et al.* references fail to disclose.

The Examiner is respectfully requested to reconsider and withdraw the 35 U.S.C. 103(a) rejection of claims 15 to 18.

In view of the foregoing, early favourable consideration of this application is earnestly solicited.

Respectfully submitted,
KOON H. TEO, ET AL

By _____
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Date: June 9, 2005
RAB:MPP:acb